4th National CHP Roadmap Workshop
Chicago, September 22-24, 2003

This document contains the speaker notes that accompanied the above PowerPoint slide show. They are best viewed simultaneously with the show itself, which is located at the following URL:

http://www.hud.gov/offices/cpd/energyenviron/energy/library/roadmap092203mod.pps

CHP for Housing and Community Development

- "CHP" = combined heat and power.
- CHP systems generate electricity and useful heat from the same plant.
- CHP covers a range of technologies, but always includes a prime mover (an engine) driving an electrical generator, plus a heat recovery system.
- CHP increases the efficiency of the system, from about 33% for generating electricity alone, to over 80% for using both the heat and power from the same fuel.
- CHP systems can provide cooling through the use of absorption chillers that utilize heat as their energy source. They also can function as a desiccant and dry the air.

HUD 2002 Energy Action Plan

- How did HUD get involved with combined heat and power?
- HUD has an energy action plan (see http://www.hud.gov). It was created by the deputy secretary's energy task force to support the president's national energy policy.
- Two of the 21 actions are:
  - Promote the use of CHP in housing and community development, and
  - Promote the use of energy star products, which includes CHP systems.
- Our strategy began with a search for HUD projects that employ CHP.
- Now teaming up with the department of energy with a working agreement beginning in 2003.

Why CHP for Multifamily?

- The housing best suited to CHP is apartment buildings.
- Here are some of the factors that support using CHP for multifamily housing.

HUD CHP Markets

- There are three major groups of housing in HUD programs. They can be considered as "markets":
  1. Public housing owned and operated by local public housing authorities;
  2. Privately-owned FHA-insured "market" properties;
  3. Senior housing owned by nonprofit groups.
- Each has its own economics, constituents and associations, and HUD rules and offices.
- HUD community development and Brownfield redevelopment programs can use combined heat and power for their new construction.
- Let's look at some early and current experience in these "markets."

Public Housing Inventory

- The public housing "market" consists of over a million units owned by 3,200 local public housing authorities. HUD pays over $1 billion a year toward utility expenses, plus other operating costs.
- 4,500 properties range in size up to 49 units, and 7,100 have over 50 units.
- One question to consider is how big a project is needed to justify the investment.
- Two early examples of the use of CHP in public housing in Michigan and Vermont illustrate the issues that have to be resolved to create a successful project.

Early Public Housing Experience - Michigan (1987)

- This senior housing project near Detroit had to buck stiff opposition from its utility to put the system on line.
- Then they found they could not keep it running well without an outside contractor, and that added cost.
- The prime mover (the engine) had to be replaced every 3-4 years.
- The utility only offered 1.1 cents/KWH to buy the excess power that cost the PHA about 5 cents to generate. It levied steep charges for administration and standby power.
- The bottom line was, though the system paid off in five years, they shut it down after seven.

Early Public Housing Experience - Vermont (1987)

- In Vermont, this ten story all-electric senior project had to find ways to release the heat they could not use.
- In time, electricity prices actually declined, but gas cost significantly more.
- They had difficulty finding steady outside maintenance.
- The good news was that they still were able to pay off their energy performance contract in ten years, but the savings are now so low that there is less incentive to keep the system running.

Current Successful Public Housing Utilizing CHP

- In the ten years since these early projects, the industry has advanced, and we have found a cluster of CHP projects in public and senior housing in Connecticut and Massachusetts.
- The project in Danbury is the subject of a separate profile that should be available soon on the HUD web site.

Wooster Manor Public Housing - Danbury, CT (1998)

- Its main features are:
  - 7-storey, 100-unit building.
  - 60 KW gas engine was installed in 1998.
  - Four floors were converted to hot water heat.
  - The system provides 70 percent of total building load.
  - A maintenance contract provides good support.
  - The gas company financed the system and conversion.
  - Energy costs dropped by almost 50 percent.

Public Housing Economics

- The economics of CHP for public housing have these features:
  - Longer payback from savings than for a private investor.
  - Conversion makes use of the thermal value.
  - Capital funds can come from HUD grants, loan or a HUD-approved performance contract.
  - A good maintenance contract will support PHA management.

FHA Insured Housing

- The FHA “market” for CHP has these characteristics:
  - Over 7,000 projects up to 49 units;
  - Over 15,000 with more than 50 units.
- We have found many projects in these states, but none in the Midwest.
- The example in our profile is in Jersey City.

Summit Plaza Complex - Jersey City, NJ (1974)

- Summit plaza was part of the HUD "operation breakthrough" industrialized construction
- Technology demonstration program.
  - It included a "total energy" approach.
  - The national bureau of standards studied it in depth.
  - NBS determined that about 160,000 gallons of fuel would be saved.
- Summit plaza's management has had more than 25 years of experience with the operation and maintenance of its CHP system.

FHA "Economics"

- The "economics" for privately-owned FHA-insured projects:
  - Needs a shorter payback than public housing.
  - Makes use of depreciation in accounting for the cost.
  - FHA may release reserves for use in financing.
  - But FHA maintains a first mortgage position, which may complicate making financing arrangements.

Nonprofit Housing - Elderly Projects

- The third HUD "market" is nonprofit housing.
- Since 1976 HUD has provided support for some 4,000 projects for seniors.
- They average about 50 units per project.
- Their economics fall somewhere between that for public and market housing.
- One important source of support for funding senior housing in Connecticut is a tax credit that companies can use if they make a contribution to a nonprofit housing organization.

Project Developer Concerns

- In our exploration of these markets for CHP, we consulted a developer who seriously considered using CHP for new construction of a 200-unit apartment development in Buffalo.
- He decided **against** going with CHP for these reasons:
  - The bottom line for him was the utility charges of $50-$60,000 a year.
  - He went instead with in-the-wall appliances.
  - But other developers are coping with these constraints. HUD will examine their experience in cooperation with the department of energy's CHP program.

Obstacles Facing Packager

- In our search for examples of CHP, we heard from a company that installs CHP packages.
- It identified two types of obstacles.
  - The first was that engineers are not trained to recognize the new CHP systems with components packaged for smaller buildings.
  - The second has to do with how HUD and DOE programs recognize the potential for CHP.

Community Development Agendas

- The community development opportunities were demonstrated in the 1980's district heating/cooling program.
- DOE and HUD grants for design of district energy systems underscored the importance of using the thermal energy from CHP (cogeneration) to clinch the economics of community energy systems.
- Today, Buffalo is expanding its district heating and cooling (DHC) system; there are opportunities for connecting CHP to public housing.

- The Boston Maverick Gardens project, with help from DOE's rebuild America program and a grant from the Massachusetts Energy Trust, has confirmed that new construction will include combined heat and power.

Brownfields Agenda

- Another opportunity to make use of CHP is in the redevelopment of Brownfields.
- We are looking for examples, and these are some of the prospects.
- We should get to hear more about these opportunities October 27-29 at the 2003 Brownfields conference in Portland, Oregon.
- There will be a workshop entitled "energizing Brownfields."
- For information see http://brownfields2003.org.

2003 DOE-HUD CHP Working Agreement

- DOE and HUD have developed a work agenda to promote CHP in housing and community development.
- These are the six components.
- In addition to the case studies, we want to take a closer look at the market factors.
- The "cogeneration manual" was developed for New York City in the late 1980's. We want to update it and edit it so that it speaks to each of the HUD market areas.
- Peer networks will enable managers of public housing to talk with other public housing agencies about the details of their CHP financing, installations and maintenance.
- DOE's five new regional CHP application centers plus the experienced Chicago center will also be linked to HUD programs and field staffs.

Contacts for 2003 DOE-HUD CHP Working Agreement

- HUD will be working with the whole DOE distributed energy team, including Ron Fiskum (program manager for buildings CHP) and Debbie Haught (microturbines) and Phil Fairchild (ORNL).
- The effort will be coordinated through Merrill Smith, the program manager for CHP.

HUD Sources of Information

- No speaker notes.

RESOURCES (5 slides)

- No speaker notes.